

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET
SACRAMENTO, CA 95814-5512



DATE: March 1, 2002

TO: Interested Parties

FROM: Connie Bruins, Compliance Project Manager

SUBJECT: Three Mountain Power Plant Project (99-AFC-2C). Public Review of Staff Analysis of the Petition to Modify Air Quality Conditions of Certification

On December 17 and 18, 2001, the California Energy Commission (Energy Commission) received requests to amend the Energy Commission Decision for the Three Mountain Power Plant (TMPP) Project. The 500-megawatt natural-gas-fired project was certified on May 16, 2001. The proposed changes to the Air Quality (AQ) Conditions of Certification (COCs) are listed below.

1. **COCs AQ-27 and AQ-34:** Allow a higher sulfur content of supplied natural gas.
2. **COC AQ-38, AQ-41 and AQ-42:** Change the method of determining compliance of the PM₁₀ emission limit. The total hourly, daily and annual PM₁₀ emission limits will not change. The petition also includes a request to increase the hourly, daily and annual SO₂ emission limits using the Environmental Protection Agency's (EPA's) emission factor. In addition, the applicant requests a wording change to COC AQ-41 to clarify that emissions are for each gas turbine.

To mitigate any potential SO₂ emission increases, TMPP proposes to provide ten additional woodstove units to the existing Woodstove Replacement/Fireplace Retrofit Program. The Shasta County Air Quality Management District approved the modifications on December 14, 2001 and January 3, 2002.

Energy Commission staff reviewed the petition and prepared the enclosed analysis of the proposed changes. This analysis provides staff recommendations for revised/new project conditions of certification that will ensure that the proposed modifications will not cause any new or additional significant environmental impacts, and that the project will remain in compliance with all applicable laws, ordinances, regulations, and standards. Based on the results of this analysis, Commission staff intends to recommend approval of the petition at the April 3, 2002 Business Meeting of the Energy Commission.

If you have technical questions concerning the enclosed staff analysis, please contact Tuan Ngo at (916) 654-3852 or by e-mail at tngo@energy.state.ca.us. If you have questions concerning the amendment process, please call me at (916) 654-4545 or by e-mail at cbruins@energy.state.ca.us.

If you wish to submit written comments concerning the enclosed staff analysis, your comments must be received no later than April 1, 2002.

Enclosure

AIR QUALITY ANALYSIS OF THE THREE MOUNTAIN POWER AMENDMENT PETITION

Tuan Ngo, P.E.

THE AMENDMENT PETITION

Three Mountain Power, LLC (the applicant) requests that conditions of certification AQ-27, 34, 38, 41 and 42 of the Final Certification Decision of the Three Mountain Power Plant (TMPP) be modified as follows:

1. **AQ-27 and AQ-34:** Increase the sulfur content of natural gas from 0.4 to 1 grain per 100 cubic feet (gr./100 scf).
2. **AQ-38:** Change the reference to the particulate grain loading (or mass per unit volume) of the turbine/heat recovery steam generator (HRSG) limitation, so that only the portion of particulate that is captured by filter is used in the compliance verification. The total hourly, daily and annual PM₁₀ emissions of the turbine/HRSG are not changed. In addition, the applicant also requests an increase of the turbine/HRSG power train hourly SO₂ emission limit to reflect the correct emission factor that is published by the federal Environmental Protection Agency (EPA).
3. **AQ-41 and AQ-42:** Increase the daily and annual sulfur dioxide (SO₂) emission limits for the turbine to reflect the correct emission factor published by the EPA. In addition, the applicant requests a wording clarification of condition AQ-41 to avoid problem that may arise when the facility starts to operate.

To mitigate any potential emission increases as a result of the amendment request, the applicant proposed to provide ten (10) additional wood stove units to the approved "Wood Stoves Replacement Program".

PURPOSE OF STAFF'S ANALYSIS

Staff's objectives in completing the air quality analysis for this amendment request are (1) to identify whether there is a potential for a significant air quality impact; and (2) to assure that appropriate mitigation measures have been applied to avoid or mitigate the identified potential air quality impacts.

LAWS, ORDINANCES, RULES AND STANDARDS (LORS)

FEDERAL

Under the Federal Clean Air Act (40 CFR 52.21), there are two major components of air pollution law, the New Source Review (NSR) and Prevention of Significant Deterioration (PSD) programs. NSR is a regulatory program, which applies to new or modified stationary sources located in areas that are not in attainment with federal ambient air quality standards. Conversely, PSD is a regulatory program that applies to new or modified stationary sources located in attainment areas. Both of these programs have been delegated by the United States Environmental Protection Agency (EPA) to the

Shasta County Air Quality Management District (District). The PSD requirements apply only to those projects exceeding 100 tons per year for any pollutant (known as major sources).

STATE

The California State Health and Safety Code, section 41700, requires that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.”

LOCAL

Rule 2.1: New Source Review (NSR): This rule requires that the project be equipped with Best Available Control Technology (BACT) for each individual piece of equipment if its emissions exceed 25 pounds a day of reactive organic compound (ROC) or nitrogen oxides (NO_x), or exceed 80 pounds a day of particulate matter (PM₁₀) or sulfur oxides (SO_x), or exceed 500 pounds a day of carbon monoxide (CO). In addition, the rule prohibits the approval of a project if the project, including offsets, causes a new violation or makes worse an existing violation of the ambient air quality standards.

Shasta County General Plan Policy AQ-2(e): This Shasta County General Air Quality policy specifies that any new project with emissions of non-attainment pollutants or their precursors exceeding 25 tons per year shall provide appropriate emission offsets.

STAFF ANALYSIS

AQ-27 AND AQ-34

The applicant requests that the sulfur content limit of 0.4 gr./100scf contained in AQ-27 and AQ-34 be increased to 1 gr./100scf. This is necessary because the only source of Public Utility Regulated natural gas is Pacific Gas and Electric (PG&E), which will provide natural gas to TMPP facility under a contract stipulating a maximum sulfur content of 1 gr./100scf. This does not mean that all natural gas delivered to TMPP will contain that concentration of sulfur, instead, the natural gas can contain up to such sulfur content.

Staff obtained a record from PG&E from the Burney Compressor Station, which contains data for 8,758 samples of natural gas for sulfur content (see attached) for the period of December 2000 to December 2001. The sulfur content of the natural gas has never approached 1 gr./100scf, and the annual average was approximately 0.28 gr./100scf, which is still below the existing limit of 0.4 grains contained in conditions AQ-27 and AQ-34. Because the sulfur content of the supplied gas is reasonably expected to be below the existing limit, staff does not believe that the increase in sulfur content limit in the conditions of certification will result in a real increase in sulfur compound (SO₂) emissions.

AQ-38

The applicant requests two changes to this condition of certification. First, that the PM₁₀ grain loading (or the mass of PM₁₀ per unit volume of exhaust) be verified using the filterable portion of PM₁₀ only¹. Second, that the hourly SO₂ emission limit be increased from 1.24 to 2.10 pounds.

According to the District Final Determination of Compliance (FDOC), the project gas turbine/HRSG power train is required to meet BACT of no more than 0.0012 gr/scf PM₁₀ grain loading using the filterable PM₁₀ portion only. Thus the applicant's request is consistent with the District condition, and this request does not affect the PM₁₀ emissions of the turbine/HRSG power train. Therefore, there will be no additional impact to the environment.

The applicant also requests that the hourly SO₂ emissions limits specified in condition AQ-38 be revised to reflect the correct SO₂ emissions using the EPA estimation method. Staff has reviewed the calculation method and believes that the requested SO₂ emissions are acceptable. However, allowing a higher SO₂ emission limit would result in an increase of the project's potential daily and annual SO₂ emissions, therefore further mitigation would be needed for any identified potential impact. Because the daily and annual SO₂ emission limits are specified in conditions AQ-41 and AQ-42, staff's analysis of potential impacts and mitigation will be presented in the following section.

AQ-41 AND AQ-42

For condition AQ-41, the applicant asks for a clarification that the specified daily emission limits are specific for individual turbine/HRSG power trains. Staff reviewed the FSA and the District FDOC, and believes that indeed the specified limits are for individual turbine/HRSG power trains; therefore, staff recommends that this clarification be provided.

Also for AQ-41, the applicant requests that the daily SO₂ emission limit of the turbine be increased from 30 to 51 pounds per day to be consistent with the requested hourly SO₂ emission limit.

For AQ-42, the applicant requests that the annual SO₂ emission limit of the turbine be increased from 10 to 17 tons per year to be consistent with the requested hourly SO₂ emission limit.

Because the area is non-attainment for the state 24-hour PM₁₀ standard, and SO₂ is a precursor to PM₁₀, an increase in SO₂ emissions will result in an increase in PM₁₀ impact to the environment. This is consistent with the Commission Decision, which states, in part, that " the project's impacts will contribute to the PM₁₀ violations in the

¹ For clarification, the PM₁₀ test collects particulate in two separate states (or forms). One is already in the solid state and can be caught by an ordinary filter. This portion of particulate is referred to as filterable. The other form of particulate is not in a solid state, so it is collected by passing the exhaust gas through a series of liquid containers. This portion of particulate is referred to as the impinger or condensable catch. The total of the two portions of particulate is used to verify compliance with the hourly, daily and annual PM₁₀ emission limits.

area that regularly occur during the cold months of the year...". Staff, therefore, believes that mitigation should be provided.

The amendment request will result in a total of 7 tons per year of SO₂. Of this, staff identified the portion that needs to be mitigated is the increase of SO₂ emissions in the three cold months, i.e., 1.75 tons of SO₂.

Not all SO₂ will convert to PM₁₀. Studies during the past two decades have indicated that the conversion of SO₂ to particulate is about 0.01 to 1 percent per hour. Ambient sulfate particulate and PM₁₀ data, collected in Redding during the period of November 1999 to January 2000, show a range of 1 to 10 percent of sulfate particulate compared to total PM₁₀. Assuming a maximum 10 percent conversion using the ambient monitoring data, the project's secondary PM₁₀ contribution to the area can be estimated to be 0.2 ton (round up from 0.175) or 350 pounds of PM₁₀ sulfate on an annual basis.

The applicant proposes to provide 10 additional wood stoves to the "Wood Stove Replacement Program", which was recommended and approved by the Commission as local PM₁₀ mitigation for the TMPP. Appendix B of the staff Final Staff Assessment (FSA) shows that the replacement of each stove with an EPA Phase II certified unit will generate approximately 197 pounds of PM₁₀ per year. For 10 additional units, the total PM₁₀ emission reductions are 1,970 pounds or 1 ton per year. This would be more than adequate to mitigate the project's secondary PM₁₀ contribution (0.2 ton/year) as a result of this amendment request. The impact of the project, due to the amendment, will be reduced to a level of less than significant with the additional proposed mitigation.

COMPLIANCE WITH LORS

FEDERAL

The amendment request is of a minor modification, which is not expected to trigger a full review of the federal permit requirement. Therefore, continue compliance with the federal PSD is expected.

STATE

The amendment is not expected to cause any significant emission increase, and will be fully mitigated; therefore, it would not expect to cause any injury, detriment, nuisance or annoyance to the public.

LOCAL

The project SO₂ emissions, after the amendment, are 17 tons per year, which are below the offset requirement threshold of Shasta County; therefore, continuing compliance is expected.

These amendments do not affect the basic operation or control system of the project, therefore, continuing compliance with the District's NSR Best Available Control Technology is expected.

The District has notified staff that it supports the amendment request, and that the project is expected to be in compliance with all applicable District Rules and Regulations.

CONCLUSION AND RECOMMENDATIONS

- The amendment will not result in any actual increase of PM₁₀ emissions.
- The amendment will result in a slight increase of SO₂ emissions, which are fully mitigated with PM₁₀ emission reductions from the addition of 10 wood stove units to the existing Wood Stove Replacement Program.
- The amendment will not result in any significant impact to the environment.

Staff recommends approval of the following revised conditions, in strike out (for deletion) and underline (for addition) form, of certification AQ-27, AQ-34, AQ-38, AQ-41 and AQ-42.

REVISED CONDITIONS OF CERTIFICATION

AQ-27 Combustion turbines and duct burners shall be exclusively fueled with California PUC pipeline quality natural gas with a sulfur content not to exceed ~~0.4~~ 1 grain per 100 standard cubic feet. [PSD]

Verification: The project owner shall secure documentation from the natural gas suppliers of the sulfur content of the fuel and submit such documentation as required in Condition AQ-59(g).

AQ-34 Best Available Control Technology for the combustion turbines shall be defined as the following emission control technologies applied to each combustion turbine capable of achieving the emission standards specified in Condition AQ-38 of this permit:

Particulate Matter	State-of-the-art combustion turbines, good combustion practices, mist eliminators for lube oil vents, exclusive combustion of natural gas containing no more than 0.4 <u>1</u> grain of sulfur per 100 standard cubic feet of natural gas
Oxides of Nitrogen	Dry low-NOx combustors, low-NOx duct burners, selective catalytic reduction with ammonia injection
Reactive Organic Compounds	Good combustion practices, coincidental VOC reduction by the use of a CO oxidation catalyst
Carbon Monoxide	Good combustion practices and use of a CO oxidation catalyst

[PSD]

Verification: At least ninety (90) days prior to the start of rough grading, the project owner shall submit to the District and the CPM for approval the final selection and design details of the gas turbines and associated equipment, including all proposed post combustion control systems.

AQ-38 Emissions from each gas turbine, duct burner, and associated HRSG shall meet all of the emission limitations listed in a. through g. below for each power train at any firing rate and ambient conditions (except as noted in Condition AQ-39):

<u>Pollutant</u>	<u>GE</u>	<u>Westinghouse</u>	<u>Either CTG Manufacturer</u>	<u>Verification</u>
<u>a.</u> NOx as NO ₂	18.9 ² pounds per hour	16.8 ² pounds per hour	2.5 ppmvd ² , 1-hr rolling averaging @ 15% O ₂	Verified by CEMS and annual compliance test at maximum operating capacity of the turbines ¹
<u>b.</u> CO	18.5 pounds per hour	16.3 pounds per hour	4 ppmvd, 3-hr rolling averaging @ 15% O ₂	Verified by CEMS and annual compliance test at maximum operating capacity of the turbines ¹
<u>c.</u> Ammonia slip	12.8 pounds per hour	12.8 pounds per hour	5 ppmvd, 3-hour rolling averaging @ 15% O ₂	Verified by annual compliance test at maximum operating capacity of the turbines and continuous recording of the injection rate
<u>d.</u> VOC	5.3 pounds per hour	4.4 pounds per hour	2 ppmvd, 1-hour rolling averaging @ 15% O ₂	Verified by annual compliance test at maximum operating capacity of the turbines and VOC/CO algorithms developed from initial source tests
<u>e.</u> PM ₁₀ (<u>filterable</u> + <u>condensa</u> <u>ble</u>)	22.1 pounds per hour (<u>filterable +</u> <u>condensable</u>)	16.4 pounds per hour (<u>filterable +</u> <u>condensable</u>)	0.0012 grain/dscf, 1- hour averaging @ 3% CO ₂ (<u>filterable</u>)	Verified by annual compliance test at maximum operating capacity of the turbines and algorithms developed from initial source tests
<u>f.</u> Opacity			<20% for a period aggregating more than three (3) minutes in any one (1) hour, excluding uncombined water vapor as determined by EPA Method 9	Verified by monthly visible emission evaluations and annual compliance test at maximum operating capacity of the turbines
<u>g.</u> SOx as SO ₂	4.242.10 pounds per hour	4.242.10 pounds per hour		Verified by fuel sulfur content and fuel use data

Notes: ¹After the first **five** annual compliance tests and upon written request to the APCO with adequate justification (consistent demonstration of compliance), the owner/operator may, if allowed by the APCO, use CEM data to verify compliance with the NOx and CO emissions specified above. The owner/operator may also reduce the frequency of testing for VOC and SOx emissions from the HRSG exhaust and the PM₁₀ emission testing of the cooling tower after the first **five** annual compliance test if consistent demonstration of compliance has occurred and if allowed by the APCO in accordance with District Rule 2:11a.3.(f).

² The owner/operator shall install a SCR system that is designed to meet a NOx emission limit of no more than 2.0 ppm, based on a 1-hour rolling average (Demonstration NOx Limit), and guaranteed by the SCR vendor to meet the Demonstration NOx Limit, to the extent that the SCR vendor will provide such a guarantee to the owner/operator. The owner/operator shall install, operate, and maintain the SCR system in a manner designed to achieve the Demonstration NOx Limit, and in conformance with the SCR vendor's installation, operation, and maintenance procedures. For a period of three years commencing with commercial operations, the owner/operator will conduct a demonstration program with District and the CEC CPM oversight to determine whether the owner/operator is able to reliably and continuously operate while maintaining the Demonstration NOx Limit. (The District shall consider allowable excess emissions in accordance with District Rule 3:10 when evaluating the facility's performance with respect to the Demonstration NOx Limit. In addition, the District will consider whether the Demonstration NOx Limit has been achieved on a consistent basis within the allowances under District Rule 3:10 with suitable compliance margin of at least 10% over the entire range of turbine operating conditions, including duct firing, and over the entire range of ambient conditions). Upon conclusion of this three-year demonstration program, if the District determines that the owner/operator can reliably and continuously operate while maintaining the Demonstration NOx Limit, the owner/operator shall accept the Demonstration NOx Limit and correspondingly adjusted hourly mass emission limitations in the facility's Permit to Operate. Should the District and the CEC CPM determine that the owner/operator cannot reliably and continuously operate while maintaining the Demonstration NOx Limit, the NOx emission limit in the facility's Permit to Operate shall remain unchanged. [PSD]

Verification: ~~See Condition AQ-59 and its verification.~~ By the 15th day of the following month, the project owner shall submit to the District and the CPM the monthly compliance report that includes all required information specified in condition AQ-59. The information shall be maintained on site for a minimum of five years and shall be made available to the District, EPA and CEC personnel on request.

AQ-41 The facility total emissions from each gas turbine/HRSG power train and cooling tower including periods of all equipment startups, shutdowns, and operational modes shall not exceed the following limits during any calendar day:

	GE	Westinghouse	Cooling Tower
PM ₁₀	657 pounds per day	503 pounds per day	37.5 pounds per day
NOx as NO ₂	679 pounds per day	638 pounds per day	
CO	1832 pounds per day	2603 pounds per day	
SOx as SO ₂	3051 pounds per day	3051 pounds per day	
VOC	258 pounds per day	386 pounds per day	
NH ₃	307 pounds per day	307 pounds per day	

[PSD]

Verification: ~~See Condition AQ-59 and its verification.~~ By the 15th day of the following month, the project owner shall submit to the District and the CPM the monthly compliance report that includes s all required information specified in condition AQ-59. The information shall be maintained on site for a minimum of five years and shall be made available to the District, EPA and CEC personnel on request.

AQ-42 The facility total emissions from both gas turbine/HRSG power trains, and the cooling tower, including periods of all equipment startups, shutdowns, initial commissioning and operational modes, shall not exceed the following ton per year limits during any consecutive twelve-month period:

	GE (2CTGs)	Westinghouse (2CTGs)	Cooling Tower
PM ₁₀	167 tons per year	137 tons per year	7 tons per year
NOx as NO ₂	144 tons per year	130 tons per year	
CO	268 tons per year	401 tons per year	
SOx as SO ₂	4017 tons per year	4017 tons per year	
VOC	41 tons per year	65 tons per year	

[PSD]

Verification: ~~See Condition AQ-59 and its verification.~~ By the 15th day of the following month, the project owner shall submit to the District and the CPM the monthly compliance report that includes s all required information specified in condition AQ-59. The information shall be maintained on site for a minimum of five years and shall be made available to the District, EPA and CEC personnel on request.